

Next Generation Science Standards in MENA American Curriculum Schools

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Executive Summary

The Next Generation Science Standards (NGSS) are currently being implemented across selected states in the US and in American curriculum schools abroad, including in the Middle East and North Africa (MENA). How are these standards being implemented? This white paper examines how this implementation in the US and in the MENA region is taking place, and cites resources that policymakers, school administrators, and teachers can use to raise awareness around NGSS and help successfully deploy these standards.

Introduction

The goal of the Next Generation Science Standards is to improve K-12 science education for all students. These standards give local educators the flexibility to design classroom learning experiences that stimulates students' interests in science and prepares them for college, careers, and citizenship.

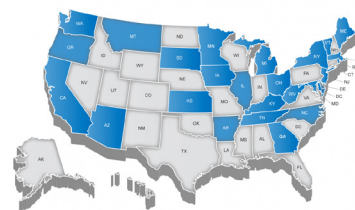
American curriculum schools worldwide are implementing the NGSS, including the American curriculum schools in the MENA region.

In this white paper, we will explore the following questions:

- How are NGSS being implemented in the USA and in the MENA region?
- What resources exist to best support schools in the transition to the NGSS?
- How did MENA science educators respond to a NGSS survey?

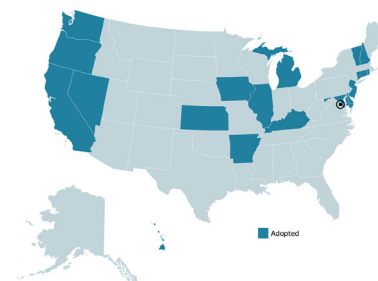
NGSS in the USA

Immediately upon completion of the Framework for K-12 Science Education in 2011, the NGSS writing team began the two-year process of preparing the standards. 26 lead states guided the development of the standards. The writing team was composed of 40 experts in elementary school science, middle school science, high school science, students with disabilities, English language acquisition, state level standards and assessment, and workforce development; along with content area experts. K-12 educators played a central role in the development and made up over half of the writing team.



The writing process can best be described as a cycle of write, review and revisit – as can be seen in the graphic shown here. Several rounds of review with multiple stakeholder groups, including the 26 lead states, were conducted. Each group received draft standards at least twice throughout the development process. Following each of these reviews, the writers made changes that reflected the feedback

As of 2016, 17 states, and the District of Columbia (Washington DC), have adopted the NGSS. These 17+ states account for an estimated 35% of public school students nationwide. In addition to these states that have adopted the NGSS in their entirety, there are approximately 13 other states that have adopted the standards with only some minor revisions or additions. In some states the school districts are choosing to adopt the standards even before the state education department, or legislature, takes official action to adopt.



Since the release of the NGSS in 2013, states and school districts have undertaken the task of moving the standards from being mere statements in a document to being a reality in classrooms. The path toward full implementation has taken on many different trajectories and timelines, depending on the local context. However, reviews of many of the state NGSS implementation plans reveal a set of common elements and timelines. These common elements include planning for:

- Communication
- Capacity/network building
- Professional Learning for all stakeholders
- Examination of Instructional Learning Materials
- Development of an Assessment System
- State and Local Policy Development

If you are looking for examples and guidance from states that are well on their way to implementation, these links will take you to Washington, Iowa and California's implementation plans.

For additional support for implementing the NGSS you can access materials developed

by both Achieve Inc. and the National Research Council (NRC). The Achieve Inc. resource is a guidebook for adoption and implementation of the NGSS. While it largely speaks to states, it does describe essential elements of implementation applicable to all. You can access the guidebook, for free, [here](#). The NRC guidebook on implementing the NGSS can be accessed, also for free, from the National Academics Press [here](#).

NGSS in the MENA region

Over the past year and a half, while working towards unpacking and implementing the NGSS with a number of American curriculum schools across the MENA region (Kuwait, Saudi Arabia, United Arab Emirates, and Jordan), an interesting pattern has emerged. Teachers new to the NGSS often walk into training with a deep sense of apprehension about what the NGSS is all about and how the NGSS will impact science learning in the classroom. However, about thirty minutes into the training, the collective realization that the vision of the NGSS resonates deeply with what teachers believe science learning should look like in classrooms sets in. As educators dig deeper in terms of unpacking and understanding the standards, teachers are able to see the value and vision of how the NGSS offers a consistent and complex framework of K-12 student performance expectations to gauge what students “know, understand and do” (Erickson, 2012) in science learning. It is clear, however, that the complexity, depth and rigor demanded by the NGSS cannot be achieved overnight.

Implementing the NGSS with intellectual rigor and integrity requires a “systems thinking approach” (Fullan, 2005). Translating the NGSS into the classroom is all about the instructional integration of science, technology, engineering, mathematics and the language arts. Although teachers are quick to point out that interdisciplinary learning and teaching is “something that they already do”, what needs to be emphasized is that the NGSS requires this integration to move beyond the factual level to the conceptual level. This is achieved by explicitly referencing and integrating the Crosscutting Concepts within the other two dimensions of the NGSS: the Disciplinary Core Ideas and the Scientific and Engineering Practices. The pertinent shift required in classroom instruction while adopting and implementing the NGSS includes the need to engage in sustained student-driven inquiry-based methodologies to explore complex scientific phenomena in science learning. This is essential to ensure that students in the NGSS classroom are emulating the behavior of real-world scientists through real-world scientific and engineering scenarios. These real-world scenarios help students focus on “big ideas” (Erickson, 2012) rather than factual regurgitation. This can be reinforced through the 5Es instructional model: “Engage, Explore, Explain, Elaborate, and Evaluate” (Bybee, 1997).

In terms of classroom instruction and evaluation, this also means that two-dimensional paper-based assessments alone will no longer be sufficient to evaluate and assess student understanding on the three-dimensional framework of the NGSS. Thus

ongoing formative assessments that help gather evidence of student understanding that further fuels and informs planning become a non-negotiable. In this sense, in terms of curriculum and instruction, it also calls for a “backwards by design” (Wiggins and McTighe, 2004) approach: beginning instruction with the end in mind. As educators dig deeper in terms of unpacking and understanding the standards, they are able to see the value and vision of how the NGSS offers a consistent and complex framework of K-12 student performance expectations to gauge what students “know, understand and do” (Erickson, 2012) in science learning. It is clear, however, that the complexity, depth and rigor demanded by the NGSS cannot be achieved overnight.

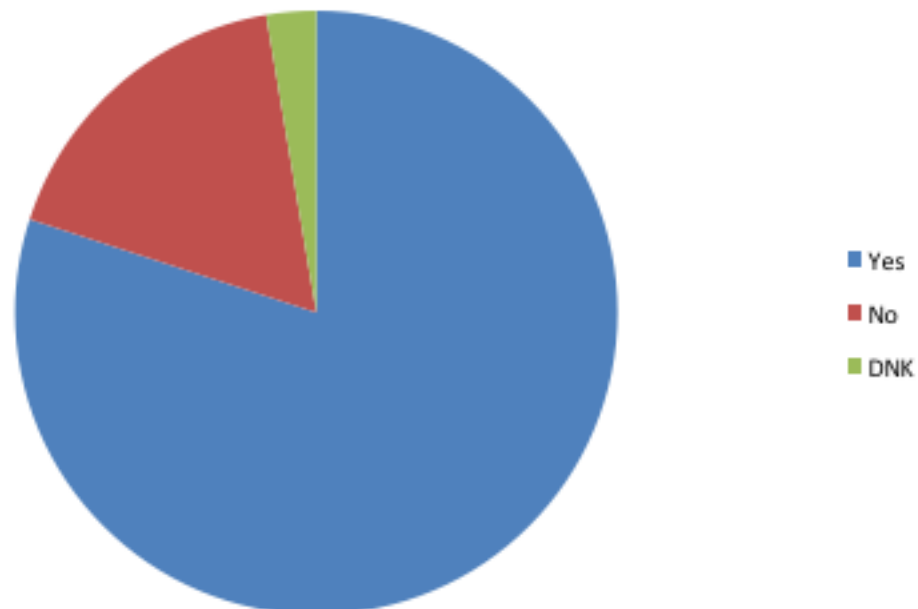
An important note about students in classrooms in the MENA region who may predominantly be non-native speakers of English: with the emphasis in the NGSS towards incorporating equity in science education, enabling accessibility to science learning for all students has never been so important. Assessing knowledge and depth of understanding in science (achieved particularly through the Scientific and Engineering practices of the NGSS) without relying on language skills could be one of the possible ways to tackle this in the classroom.

Next Generation Science Standards Survey results

In 2016, 75 science educators in the MENA region were surveyed to gauge impressions of the NGSS. The following data gives us insight on impressions of the implementation process.

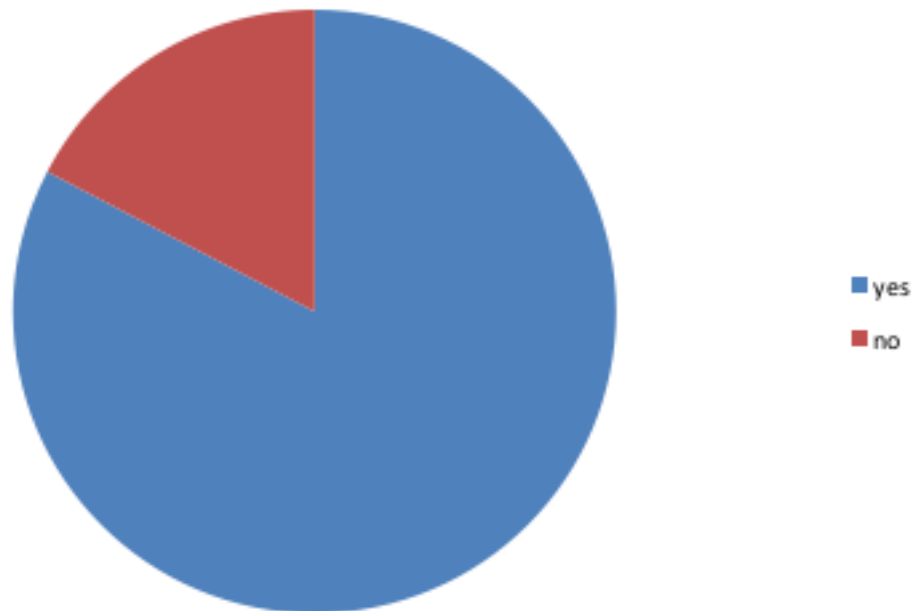
Does your school have a plan for transitioning to the Next Generation Science Standards?

The majority of survey respondents said that their school does have a plan. Thirteen cited no plan is in place and two educators did not know.



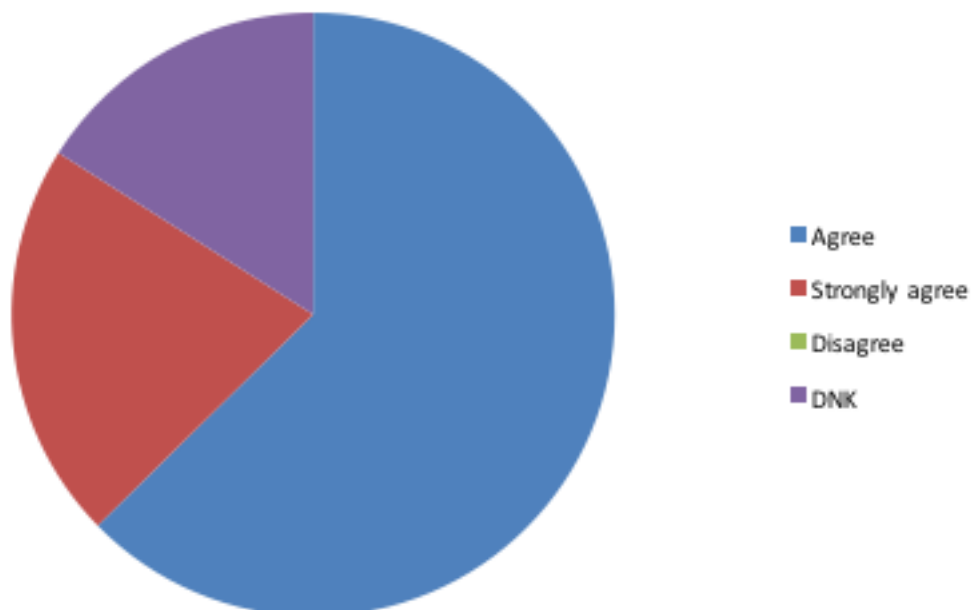
Have you read the Next Generation Science Standards that relate to your grade and subject area?

The vast majority of respondents - 83% - had read the relevant NGSS material.



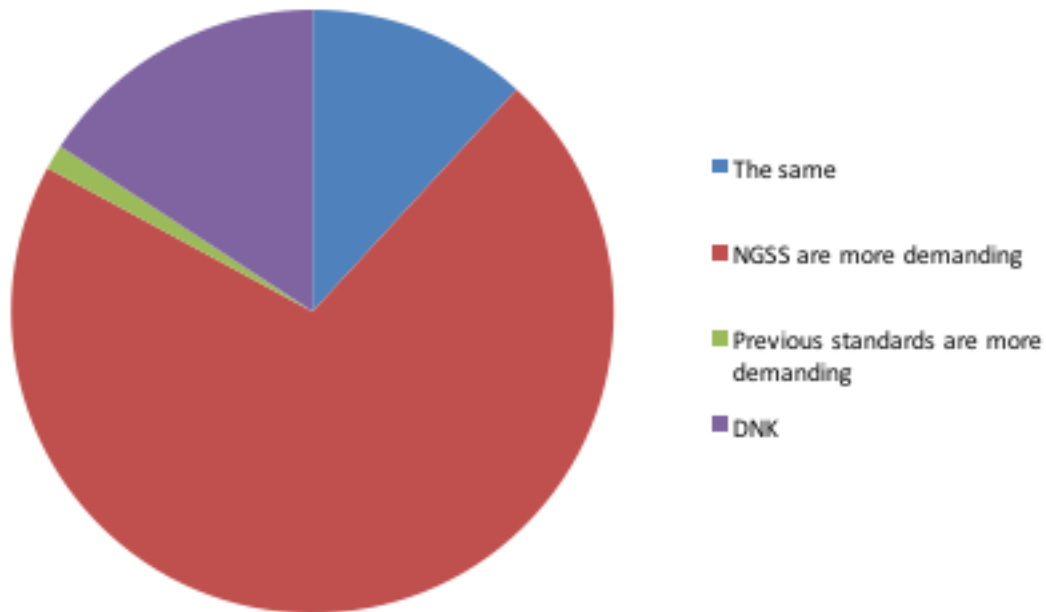
I believe that the Next Generation Science Standards will lead to improved student learning for the majority of students I serve.

63% agreed with this statement, 21% strongly agreed and 16% did not know. No one disagreed with the statement.



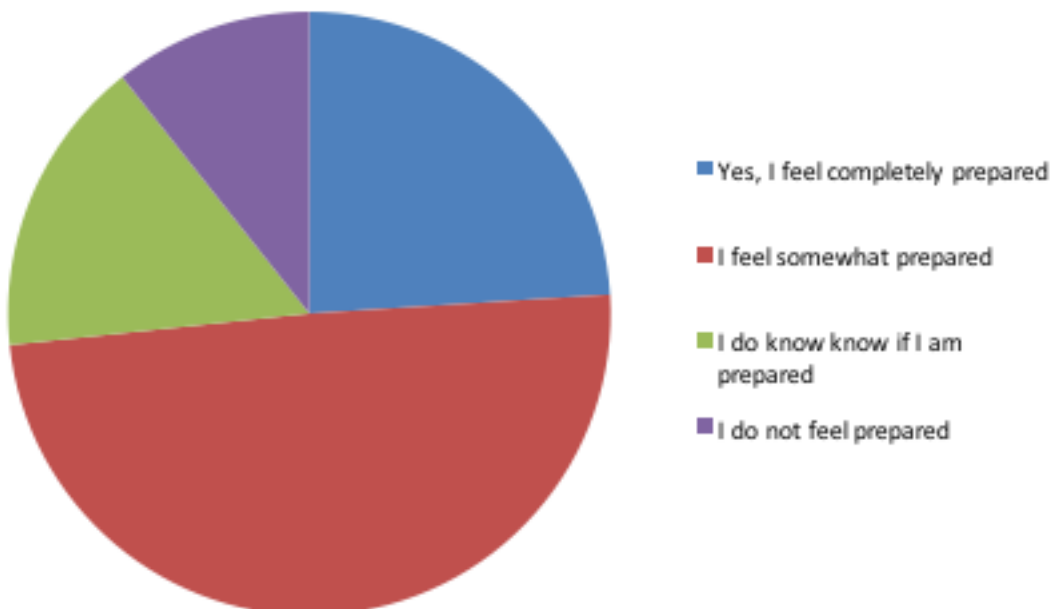
How would you describe the difference between the previous science standards and the Next Generation Science Standards?

The majority, 72%, believe that the NGSS is more demanding and raises expectations for student learning. 15% did not know, 12% felt the standards were pretty much the same and only 1% stated that the previous standards were higher.



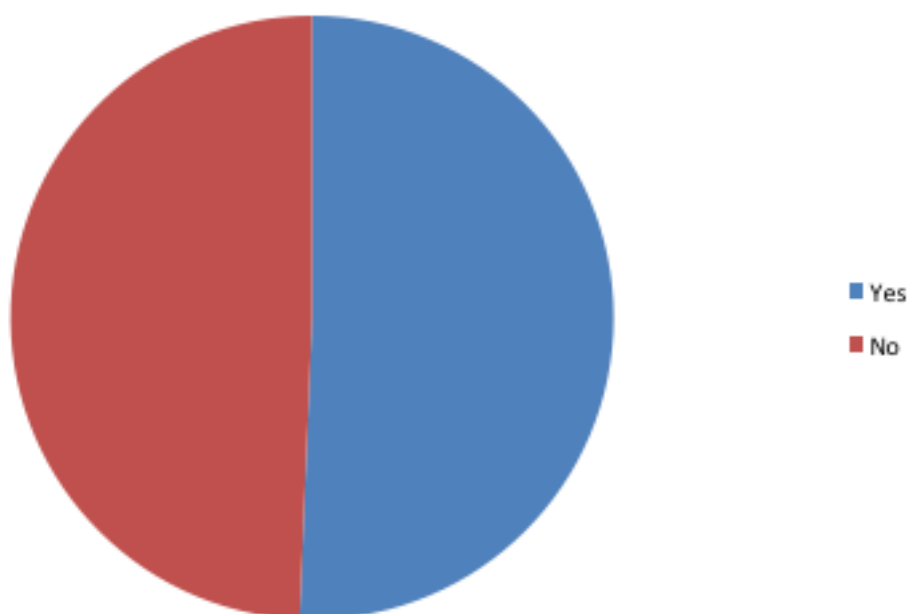
Do you feel prepared to teach the Next Generation Science Standards?

49% responded that they feel somewhat prepared. 24% feel completely prepared, with 16% not being sure and 11% feeling unprepared.



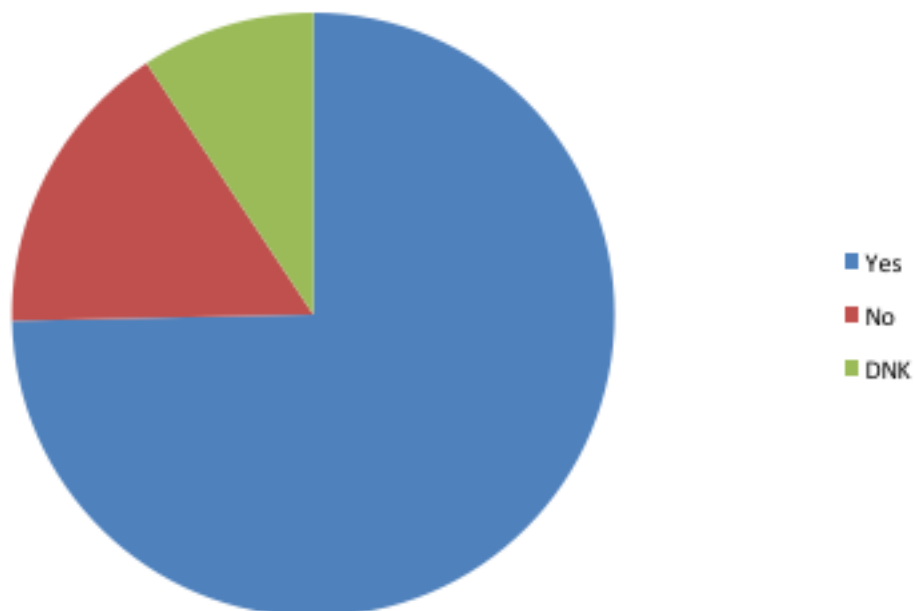
Have you participated in professional development/training on the Next Generation Science Standards?

There was an almost even split here, with 51% having had training, and 49% not having had training.



Does your school have a plan for Next Generation Science Standards implementation?

Most of the respondents - 75% - confirmed that their school does have a plan in place, with 16% responding that their school does not have a plan, and 9% not knowing.



KDSL Global Supports NGSS in the MENA region

“The NGSS forum was a doorway for educators to see that challenging boundaries and taking risks with students will allow them to see science in their daily lives.”

– Monique Childress, Collegiate American School, 2014

KDSL Global organizes professional learning for educators around the world. The following activities targeted the greater MENA region educators at American curriculum schools.

- **NGSS Forum** – Held in April 2014, this one-day forum featured four writers of the new NGSS and provided exceptional professional development to staff at American curriculum schools in the MENA region, focusing on effectively employing the NGSS in the classroom and in schools. Schools from around the region had an opportunity to explore the standards and start to make sense of earth and space science, physical science, life science, and engineering.
- **NGSS Webinars** – KDSL Global has hosted several webinars for American curriculum educators in the MENA region. These one-hour learning opportunities allow participants to explore a topic and interact with experts. So far, six NGSS webinars for hundreds of educators have been held, with plans in place for more each year.
- **MENA STEM Summit** – This summit united science, technology, engineering, and math (STEM) educationalists and industry members in the MENA region. The summit offered lessons learned from programs around the world. Two of the NGSS writers were featured speakers and led sessions focused on the standards, project based learning, and STEM.
- **NGSS Consultant** - KDSL Global offers school-based support for further understanding of the standards. Dr. Craig Gabler is an experienced professional development provider, specializing in science and STEM education.
- **MENA Common Core Conference**: This conference provided professional development to American curriculum schools in the region, focusing on effectively employing Common Core State Standards (CCSS) in the classroom. In addition, NGSS was added on as a session after feedback from schools. Schools and facilitators shared their plans for implementation and unpacked the standards and concepts together.

“Serving as a facilitator at the NGSS forum was a truly amazing experience. The organization was outstanding and the participants showed an earnest eagerness to learn about the structure of the NGSS, as well as how to bundle engineering standards with science standards in a fun, engaging manner. It was genuinely one of the best experiences I have had in presenting professional development to teachers!”

– Melissa Miller, NGSS Writer and NGSS Forum Facilitator, 2014

Conclusion

The World Economic Forum introduced 16 skills students require for the 21st century, under the following headings: foundational literacies, competencies, and character qualities. Science was listed under foundational literacies. We want students to approach complex challenges, and educators should as well. NGSS represents a shift in the why, how, and what of science teaching and learning in the 21st century. Educators must be curious, take initiative, be persistent, lead, be flexible and demonstrate awareness. All of these are qualities that need to be developed in the 21st century learner.

The KDSL Global team is available to liaise with parents, schools, governments, and educational organizations to provide more specialized consultations on NGSS in MENA's American curriculum schools.

NGSS Resources

Learning the Standards

Infographic: How Will Science Education Change with the NGSS:

- <http://www.nextgenscience.org/sites/default/files/resource/files/NewVision.pdf>

Infographic: Why it is Time for New Standards

- http://ngss.nsta.org/Documents/ngss_infographic.pdf

Overview of the NGSS and related resources from the National Science Teachers Association:

- <http://ngss.nsta.org/About.aspx>

An overview of the NGSS for principals:

- <http://ngss.nsta.org/Documents/NGSS%20Overview%20for%20Principals.pdf>

A set of videos that describe each of the 3 Dimensions of the NGSS:

- <http://www.nextgenscience.org/teachers?page=3>

Assessment

Next Generation Science Assessment – task portal – view the latest thinking on how NGSS might be assessed:

- <https://ngss-assessment.portal.concord.org>

Developing Assessments for the Next Generation Science Standards. Free download of PDF:

- www.nap.edu/read/18409

Science Assessment Item Collaborative. This guiding document is being used by many states as the develop assessment items for an NGSS assessment:

- <http://www.csai-online.org/spotlight/science-assessment-item-collaborative>

Curriculum Considerations

An excellent guide for schools wishing to implement the NGSS. Free download of PDF:

- <https://www.nap.edu/catalog/18802/guide-to-implementing-the-next-generation-science-standards>

Accelerated Model Course Pathways offers guidance to schools seeking to organize NGSS performance expectations into a compressed time frame. The Accelerated Model Course Pathways are designed for high-achieving students who want or need to pursue advanced level science courses earlier in high school, and at a more rapid pace. The resource also includes considerations about the conceptual similarities between the NGSS and Advanced Placement (AP) science courses. The conceptual similarities between the NGSS and AP Biology, AP Chemistry, and AP Physics 1 & 2 are organized in individual comparison charts as the appendices to the document.

- <http://www.nextgenscience.org/ngss-accelerated-pathways>

Description of what it means to bundle standards, why to bundle and examples:

- <http://www.nextgenscience.org/resources/bundling-ngss>

About KDSL Global

KDSL Global is a USA and UAE-based leading learning organization focused on empowering educators and education businesses globally.

Author

Kevin Simpson, Founder, KDSL Global

KDSL Global organizes professional learning for educators around the world. Simpson has served 500+ schools and thousands of educators worldwide in 20 countries. The majority of his work in education has centered on American curriculum schools. Since 2008, he has been focused on education in the MENA region, assisted numerous schools with accreditation, training, and development, and served as a thought partner on school start-up projects. Simpson is co-founder of the UAE Learning Network (one of the largest online network of educators in the UAE) and has participated in numerous education panels and radio shows discussing American curriculum. In addition, he has authored two white papers on American curriculum schools in Dubai and co-wrote a bilingual document on American Education in the UAE. He holds a Bachelor of Arts degree in Education and a Master of Education degree in Curriculum and Teaching from Michigan State University (USA). Currently, he is a member of the Association for the Advancement of International Education (AAIE) and studying at their Institute for International School Leadership.

Author

Dr. Sudha Govindswamy (Sunder), Associate Partner at KDSL Global

Dr. Sudha Govindswamy (Sunder), an affiliate consultant for the Council of International Schools (CIS), specializes in Curriculum Design and Delivery. As a certified concept-based curriculum consultant from Dr. Lynn Erickson Institute, Whitefish, Montana, Dr. Sunder works in supporting schools unpack both the Common Core State Standards (CCSS) and the NGSS, focusing on the conceptual shift classroom teachers need to understand, while implementing the standards with intellectual rigor and integrity. Dr. Sunder has been engaged in work with Kevin Simpson in the United Arab Emirates, Egypt, Kuwait and Saudi Arabia. In addition, she has worked in seven other countries. Dr. Sunder has published the IB-NGSS Relationship Study Report that was produced in collaboration with Achieve and a number of American curriculum K-12 science educators. She serves as a curriculum reviewer for the IB, is an Apple Distinguished Educator and is a SMART Exemplary Educator. Sudha earned her PG in the United Kingdom, her Master's degree in India and her doctorate in the United Kingdom.

Author

Dr. Craig Gabler

Craig Gabler is a Science/STEM education consultant and the KDSL Global science consultant for American curriculum schools in the MENA region. Previously he was at Educational Service District (ESD) 113 in Olympia, Washington, beginning in 2000. At the ESD, Dr. Gabler served as Regional Science Coordinator where his primary role was to coordinate and deliver science professional development to the 44 school districts in the region. During his time at the ESD, Dr. Gabler also served as Curriculum Director for Science & Mathematics for Tacoma Public Schools in Washington for two years. Dr. Gabler began his career in Centralia, Washington in 1975 as a high school chemistry and physics teacher. Outside of his work in districts, Dr. Gabler has been active in science education leadership. He served as the team leader of the NGSS Forum held in Dubai and has collaborated with hundreds of educators at the MENA Common Core Conference, MENA STEM Summit, MENA Teacher Summit and school-based institutes. Dr. Gabler was also a featured author in Teach UAE Magazine where he wrote an article on implementing the NGSS. Dr. Gabler received a BS in Physical Science from Washington State University, an MS in Science Education from Oregon State University, and a PhD in Science & Mathematics Education from the Curtin University in Perth, Australia. He is currently the Retiring President of the National Science Education Leadership Association. In addition, he served a two-year term as president of the Washington Science Teachers Association and as the National Science Teachers Association's District XVII Director. Leadership and leadership development continues to be an area of focus for Dr. Gabler.

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For more information about KDSL Global on how its services can help you learn about education in the MENA region, please contact Kevin Simpson at kevin@kdsलगlobal.com.
www.kdsलगlobal.com



